OFSTEST Segment Descriptions

Carryover Group YEL (Yelloweagle)

The YEL Carryover Group includes three Forecast Groups, PEC for the Pecatonica River, PAV for the Pavertin River and YEL for the Yelloweagle River. It covers the northern half of the dataset area. The Pecatonica and Pavertin Rivers join in the most downstream Segment of the YEL Forecast Group just upstream of the confluence of the combined rivers with the Yelloweagle River.

Forecast Group PEC (Pecatonica)

The PEC Forecast Group is located within a state called 'North Central' with its Segments being representative of watersheds in the North Central United States. The model parameters for the Segments come from actual calibrated basins in Minnesota, Wisconsin, Iowa, Illinois and Missouri. The Forecast Group and its main stem river are named for the Pecatonica River, located in southwestern Wisconsin and northwestern Illinois. Four of the eight rainfall-runoff models used in the Forecast Group come from the original Pecatonica River. Rainfall runoff models used include the Kansas City API model (API-MKC), the Sacramento Soil Moisture Accounting Model (SAC-SMA) and the Continuous API model (API-CONT). All of the Segments in the Forecast Group include the SNOW-17 snow accumulation and ablation model. The storm that is simulated over the dataset has lost much of its intensity by the time it reaches the area included in the PEC Forecast Group and contributes little to the runoff. Reasonably high snow accumulations combine with a warm temperature sequence to generate significant runoff. Elevations in the basin range from about 100 feet at the outlet of the JOSNC Segment to slightly over 2,000 feet along the divide in the DARNC Segment.

Because no other Forecast Groups are tributary to the PEC Forecast Group, it can be run without other Forecast Groups having been run. The outflow from the JOSNC Segment, however is used in the SLMWE Segment in the YEL Forecast Group. The PEC Forecast Group must therefore be executed before simulation in the YEL Forecast Group can be completed. The individual Segments are described below.

Segment Name: DARNC

Description:	Pecatonica River @ Darlington
Upstream Segments:	(none)
Downstream Segment:	AFTNC
Source of Basin Parameters:	Root River near Lanesboro, MN
Local Area:	779 MI2
Total Area:	779 MI2
Total Storm Precipitation:	0.11 IN
Peak 6-hour Precipitation:	0.08 IN

Background/Segment Description: The DARNC Segment is the headwater basin for the main branch of the dataset's Pecatonica River. The source basin for the snow and rainfall runoff parameters is located in

southeastern Minnesota. There is an actual gage on the west branch, Pecatonica River at Darlington, WI. Runoff from the basin is modeled using a snow model and a continuous antecedent precipitation index model.

Table A-1 is a summary of the Operations Table. Although the baseflow is included in the total runoff from the API-CONT Operation, a separate baseflow hydrograph is computed for plotting in the operational plot. Because it is a headwater basin, there are no upstream routing computations.

System Issues: The setup of the dataset in OFSTEST includes a Segment redefinition for DARNC. Changes in the new definition are a slight change in the primary baseflow recession factor (BFPK) from 0.99 to 0.994 and a change in the initial conditions for the baseflow storage contents (BFSC) from 0.96 to 1.6 inches. This illustrates the capability and the method of changing parameters and initial conditions in the forecast system.

Table A-1. Operations Table for Segment DARNC

Operation Identifier	Operation Name	Comment
SNOW-17	DARNC	Basin snow model computations
API-CONT	DARNC	Rainfall/runoff model computations
UNIT-HG	DARNC	Application of unit hydrograph to computed runoff
UNIT-HG	DARNCB	Application of unit hydrograph to groundwater portion of total inflow, for use in PLOT-TUL DARNC
CHANGE-T	RAIM	Create 24-hour from 6-hour rain+melt TS for use in PLOT-TS
CHANGE-T	SURO	Create 24-hour from 6-hour storm runoff TS for PLOT-TS
CHANGE-T	SWE	Create 24-hour from 6-hour water equivalent TS for PLOT-TS
CHANGE-T	FEIX	Create 6-hour from 24-hour frost efficiency TS for PLOT-TUL
PLOT-TS	DARNC	Plot rain+melt, storm runoff, simulated water equivalent, frost index, frost efficiency index
STAGE-Q	DARNC	Compute discharge from observed stage
ADJUST-Q	DARNC	Adjust simulated discharge to observed data
STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	DARNC	Operational plot

Segment Name: BLBNC

Description: East Branch Pecatonica River Near Blanchardville
Upstream Segments: (none)
Downstream Segment: AFTNC, (MTNNC)

Source of Basin Parameters: East Branch Pecatonica River Near Blanchardville, WI
Local Area: 364 MI2
Total Area: 364 MI2
Total Storm Precipitation: 1.13 IN
Peak 6-hour Precipitation: 0.69 IN

Background/Segment Description: The BLBNC Segment is another headwater basin for the Pecatonica River. The source basin for the snow and rainfall runoff parameters is the East Branch Pecatonica River Near Blanchardville, WI, which is in fact a headwater basin and is also the source of the Segment description used in the dataset. Runoff from the basin is modeled using a snow model and an antecedent precipitation index model. The API model used in this Segment (API-MKC) does not include a baseflow component and therefore requires the computation of baseflow as a separate component in the Operations Table.

Table A-2 is a summary of the Operations Table. Although the downstream Segment from BLBNC is identified as AFTNC, the East Branch Pecatonica River actually joins the Pecatonica River downstream of Lake Afton, within the MTNNC Segment. A diversion exists at the outlet of the basin, however, diverting 50% of the BLBNC flow to Lake Afton whenever the flow exceeds 880 CFS. Because AFTNC is upstream of MTNNC, specifying AFTNC as the downstream Segment for BLBNC assures that the correct computational sequence will be maintained. The Operations which specify the diversions are defined using Tatum Layered Coefficient routing in the downstream Segments.

Table A-2. Operations Table for Segment BLBNC

Operation Identifier	Operation Name	Comment
SNOW-17	BLBNC	Basin snow model computations
API-MKC	BLBNC	Rainfall/runoff model computations
LIST-MSP	BLBNC	Runoff/snow tabulation for basin
UNIT-HG	BLBNC	Application of unit hydrograph to computed runoff
BASEFLOW	BLBNC	Baseflow with a variable reduction rate
CHANGE-T	BFR-6	Generate 6-hour baseflow recession TS from 24-hour simulated TS for tabulation in PLOT-TUL BLBNC
ADD/SUB	MOVE ROQ	Accumulate surface runoff to local area TS
ADD/SUB	ADD BF	Accumulate baseflow to local area TS
STAGE-Q	BLBNC	Compute discharge from observed stage
ADJUST-Q	BLBNC	Adjust simulated discharge to observed data
STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	BLBNC	Operational plot

Segment Name: AFTNC

Description: Lake Afton

Upstream Segments: DARNC, BLBNC
Downstream Segment: MTNNC
Source of Basin Parameters: Pecatonica River at Martintown, WI
Local Area: 395 MI2
Total Area: 1174 MI2
Total Storm Precipitation: 0.0 IN
Peak 6-hour Precipitation: 0.0 IN

Background/Segment Description: The AFTNC Segment combines local runoff with routed flows from two upstream Segments to determine inflow to Lake Afton. The source basin for rainfall runoff parameters is the same as that for the downstream Segment (MTNNC), however some of the parameters have been adjusted and the unit hydrographs used by each Segment are not related. The reservoir simulation for Lake Afton uses a rule curve to maintain seasonal pool elevations. The simulation includes an uncontrolled spillway crest simulation at high pool elevations and a minimum release for low flows. Although the river modeled in the BLBNC Segment flows into the MTNNC Segment, 50% of the flow is diverted to Lake Afton when it exceeds 880 CFS.

Table A-3 is a summary of the Operations Table. Because the PLOT-TUL Operation can only pot time series of the same units and time interval, three plots are used to show pool elevations, reservoir inflow components (instantaneous discharge) and mean outflow (mean discharge).

Table A-3. Operations Table for Segment AFTNC

Operation Identifier	Operation Name	Comment
SNOW-17	AFTNC	Basin snow model computations
API-MKC	AFTNC	Rainfall/runoff model computations
LIST-MSP	AFTNC	Runoff/snow tabulation for basin
UNIT-HG	AFTNC	Application of unit hydrograph to computed runoff
BASEFLOW	AFTNC	Baseflow with a variable reduction rate
CHANGE-T	BFR	Generate 6-hour baseflow recession TS from 24-hour simulated TS for tabulation in PLOT-TUL AFTNC
ADD/SUB	AFTNCROQ	Accumulate surface runoff to local area TS
ADD/SUB	AFTNCBF	Accumulate baseflow to local area TS
TATUM	DARNCRTD	Route upstream flow from DARNC to reservoir
TATUM	BLBTOAFT	Divert 50% of flow from BLBNC when it exceeds 880 CFS (25 CMS)
ADD/SUB	ADDRESV1	Combine AFTNC local and upstream routed flows
ADD/SUB	ADDRESV2	"
ADD/SUB	ADDRESV3	"
MEAN-Q	RESV_INF	Compute 6-hour mean inflow from instantaneous reservoir inflow
RES-SNGL	AFTNC	Single reservoir simulation
PLOT-TUL	POOL	Plot simulated and observed reservoir pool elevation and tabulate additional TS

WEIGH-TS	CFSD/CFS	Apply a factor to convert volume to discharge
PLOT-TUL	AFTNC	Plot reservoir inflow components, tabulate additional TS
PLOT-TUL	OUTFLOW	Plot of simulated, adjusted and observed reservoir outflows

Segment Name: MTNNC

Description: Pecatonica River at Martintown
Upstream Segments: AFTNC, (BLBNC)
Downstream Segment: FEENC
Source of Basin Parameters: Pecatonica River at Martintown, WI
Local Area: 252 MI2
Total Area: 1,790 MI2
Total Storm Precipitation: 0.37 IN
Peak 6-hour Precipitation: 0.27 IN

Background/Segment Description: The MTNNC Segment is named for the actual source basin for the snow and rainfall/runoff model parameters. In this Segment, the Lake Afton (AFTNC) release and the flow from BLBNC are combined, routed and then combined with the local flow to generate the simulated total flow. Although the BLBNC Segment flows directly to MTNNC, a diversion to AFTNC requires it to be listed as an upstream Segment for AFTNC in the computational order. When the BLBNC discharge exceeds 880 CFS, the flow to MTNNC is reduced by half to account for the diversion.

Table A-4 is a summary of the Operations Table. Although an observed stage is available for the forecast point at the outlet of this basin, the simulated flow is not adjusted to be consistent with the observed discharge. The observed discharge is plotted in the PLOT-TUL Operation, however, giving the forecaster a visual cue as to the necessary adjustments that would be required to make the simulated flow match the observed discharge.

Table A-4. Operations Table for Segment MTNNC

Operation Identifier	Operation Name	Comment
TATUM	BLBTOMTN	Reduce upstream flow from Segment BLBNC by 50% when it exceeds 880 CFS (25 CMS)
MEAN-Q	BLBTOMTN	Compute 6-hour mean discharge from 6-hour instantaneous - this is required to allow addition with 6-hour mean discharge from AFTNC
ADD/SUB	AFTNCOUT	Combine upstream flow from AFTNC and BLBNC
ADD/SUB	BLBNCQ	"
LAG/K	UPQRTD	Route combined AFTNC and BLBNC flow to basin outlet
SNOW-17	MTNNC	Basin snow model computations
API-MKC	MTNNC	Rainfall/runoff model computations

LIST-MSP	MTNNC	Runoff/snow tabulation for basin
UNIT-HG	MTNNC	Application of unit hydrograph to computed runoff
BASEFLOW	MTNNC	Baseflow with a variable reduction rate
ADD/SUB	MV ROQ1	Combine surface runoff and baseflow in local time series
ADD/SUB	+ MTN-BF	"
ADD/SUB	ADD RTD	Combine upstream routed flow with MTNNC local flow
ADD/SUB	ADD LOCL	"
STAGE-Q	MTNNC	Compute discharge from observed stage
STAGE-Q	SSTG	Compute simulated stage from simulated discharge
CHANGE-T	BFR	Generate 6-hour baseflow recession TS from 24-hour simulated TS for tabulation in PLOT-TUL MTNNC
PLOT-TUL	MTNNC	Plot rain+melt, runoff and flow components

Segment Name: FEENC

Description: Pecatonica River at Freeport
Upstream Segments: MTNNC
Downstream Segment: JOSNC
Source of Basin Parameters: Pecatonica River at Freeport, IL
Local Area: 499 MI2
Total Area: 2,289 MI2
Total Storm Precipitation: 0.10 IN
Peak 6-hour Precipitation: 0.10 IN

Background/Segment Description: The name for this Segment is taken from the source basin for the snow model and rainfall runoff model parameters. The upstream flow from MTNNC is routed and combined with the local flow at the basin outlet.

Table A-5 is a summary of the Operations Table. As with the MTNNC Segment, an observed discharge is available but the simulated flow is not adjusted to match available observations, although the observations are plotted in the PLOT-TUL Operation.

Table A-5. Operations Table for Segment FEENC

Operation Identifier	Operation Name	Comment
SNOW-17	FEENC	Basin snow model computations
API-MKC	FEENC	Rainfall/runoff model computations
LIST-MSP	FEENC	Runoff/snow tabulation for basin
UNIT-HG	FEENC	Application of unit hydrograph to computed runoff
BASEFLOW	FEENC	Baseflow with a variable reduction rate
CHANGE-T	BFR-6	Generate 6-hour baseflow recession TS from 24-hour simulated TS for tabulation in PLOT-TUL FEENC
ADD/SUB	ADD ROQ	Combine FEENC surface runoff with baseflow

ADD/SUB	ADD BF	"
TATUM	MTNNCRTD	Route upstream flow from MTNNC to basin outlet
ADD/SUB	ADDRTD	Combine upstream routed flow with local flow
ADD/SUB	ADDLOCAL	"
STAGE-Q	FEENC	Compute discharge from observed stage
STAGE-Q	SSTG	Compute simulated stage from simulated discharge
PLOT-TUL	FEENC	Plot rain+melt, runoff and flow components

Segment Name: LNENC

Description: Root River near Lanesboro
Upstream Segments: (none)
Downstream Segment: JOSNC
Source of Basin Parameters: Root River near Lanesboro, MN
Local Area: 1,185 MI2
Total Area: 1,185 MI2
Total Storm Precipitation: 0.12 IN
Peak 6-hour Precipitation: 0.06 IN

Background/Segment Description: The LNENC Segment is a headwater basin that includes one of the largest MAP areas in the dataset. The rainfall runoff model parameters are taken from the same source basin as the DARNC Segment but use the Sacramento model instead of the Continuous API model. Table A-6 is a summary of the Operations Table for the LNENC Segment. This Segment includes some additional plotting features to provide additional information about the state of the snow pack and the condition of frozen ground. The simulated discharge is adjusted to be consistent with observed values.

Table A-6. Operations Table for Segment LNENC

Operation Identifier	Operation Name	Comment
SNOW-17	LNENC	Basin snow model computations
SAC-SMA	LNENC	Rainfall/runoff model computations
UNIT-HG	LNENC	Application of unit hydrograph to computed runoff
CHANGE-T	RAIM	Create 24-hour from 6-hour rain+melt TS for use in PLOT-TS
CHANGE-T	SWE	Create 24-hour from 6-hour water equivalent TS for PLOT-TS
CHANGE-T	FGIX	Create 6-hour from 24-hour frost index TS for PLOT-TUL
PLOT-TS	LNENC	Plot rain+melt, simulated water equivalent and frost index
STAGE-Q	LNENC	Compute discharge from observed stage
ADJUST-Q	LNENC	Adjust simulated discharge to observed data
STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	LNENC	Plot rain+melt, runoff and flow components

Segment Name: CHTNC

Description: Chariton River near Chariton
Upstream Segments: (none)
Downstream Segment: JOSNC
Source of Basin Parameters: Chariton River near Chariton, IA
Local Area: 481 MI2
Total Area: 481 MI2
Total Storm Precipitation: 0.73 IN
Peak 6-hour Precipitation: 0.30 IN

Background/Segment Description: This Segment is another headwater basin named for the source basin for snow model and rainfall runoff model parameters. Table A-7 is a summary of the Operations Table which includes an antecedent precipitation index model and separate baseflow computation. A tabulation of snow and rainfall runoff models is included in addition to the standard plotting operation.

System Issues: The CHTNC Segment is not defined in the first set of Segment definitions, but is defined later as a subdivision of the JOSNC Segment. It exercises the ability of the system to create new Segments by subdividing existing ones. This procedure would typically be used after the establishment of a new stream gaging station. After a sufficient period of record has been established to allow calibration of parameters, the new Segment can be defined. In this case, the snow model parameters are similar to those used in the sub-area of the JOSNC Segment from which the CHTNC Segment was derived, but the rainfall runoff model parameters have been revised.

Table A-7. Operations Table for Segment CHTNC

Operation Identifier	Operation Name	Comment
SNOW-17	CHTNC	Basin snow model computations
API-MKC	CHTNC	Rainfall/runoff model computations
UNIT-HG	CHTNC	Application of unit hydrograph to computed runoff
BASEFLOW	CHTNC	Baseflow with a variable reduction rate
CHANGE-T	CHTNC	Generate 6-hour baseflow recession TS from 24-hour simulated TS for tabulation in PLOT-TUL BLBNC
ADD/SUB	CHTNCROQ	Combine surface runoff and baseflow
ADD/SUB	CHTNCBF	"
STAGE-Q	CHTNC	Compute discharge from observed stage
STAGE-Q	SSTG	Compute simulated stage from simulated discharge
LIST-FTW	CHTNC	List time series summarizing snow and rainfall runoff models
PLOT-TUL	CHTNC	Plot rain+melt, runoff and flow components

Segment Name: JOSNC

Description:	Pecatonica River at Joslin (including Steelville Local)
Upstream Segments:	FEENC, LNENC, CHTNC
Downstream Segment:	SLMWE
Source of Basin Parameters:	Pecatonica River at Joslin, IL and MeramecRiver near Steelville, MO
Local Area:	1,089 MI2
Total Area:	5,044 MI2
Total Storm Precipitation:	1.75 IN
Peak 6-hour Precipitation:	1.12 IN

Background/Segment Description: The JOSNC Segment includes two sub areas, the Steelville local (SEENC) and the Joslin local (JOSNC).

Table A-8 is a summary of the Operations Table. All four upstream flows, including the SEENC flow, are combined and routed together to the basin outlet. The JOSNC local flow is then added. Although an observed discharge time series is available, the simulated flow is not adjusted by it, but it is plotted for comparison.

System Issues: The JOSNC Segment includes a major Segment redefinition following the first initialization. The original Segment definition includes an upper area and a lower area, in addition to the Steelville local area. The new CHTNC Segment takes in most of the JOSNC upper area, leaving a small piece of the upper area to be added to the lower area, which is referred to in the JOSNC redefinition simply as the Joslin local area.

Table A-8. Operations Table for Segment JOSNC

Operation Identifier	Operation Name	Comment
SNOW-17	SEENC	Steelville local area (SEENC) snow model computations
SAC-SMA	SEENC	SEENC rainfall/runoff model computations
UNIT-HG	SEENC	Application of unit hydrograph to computed runoff
CHANLOSS	SEENC	Channel or evaporation loss, varying by month
PLOT-TUL	SEENC	Plot of SEENC simulated flow
SNOW-17	JOSNC	Joslin area snow model computations
API-MKC	JOSNC	Joslin rainfall/runoff model computations
LIST-MSP	JOSNC	Runoff/snow tabulation for basin
UNIT-HG	JOSNC	Application of unit hydrograph to computed runoff
BASEFLOW	JOSNC	Baseflow with a variable recession rate
CHANGE-T	BFR	Generate 6-hour baseflow recession TS from 24-hour simulated TS for tabulation in PLOT-TUL JOSNC
ADD/SUB	ADD ROQ	Combine JOSNC surface runoff and baseflow
ADD/SUB	ADD BF	"
ADD/SUB	LNENC	Combine LNENC, CHTNC, FEENC and SEENC flow
ADD/SUB	CHTNC	"
ADD/SUB	FEENC	"

ADD/SUB	SEENC	"
TATUM	ROUTED	Route combined upstream flow to basin outlet
ADD/SUB	ADD RTD	Combine routed flow and JOSNC local flow
ADD/SUB	ADD LCL	"
STAGE-Q	JOSNC	Compute discharge from observed stage
STAGE-Q	SSTG	Compute simulated stage from simulated discharge
PLOT-TUL	JOSNC	Plot rain+melt, runoff and all flow components

Forecast Group PAV (Pavertin)

The PAV Forecast Group coincides with the boundaries of a state called 'North East' with its Segments representing basins in the North Eastern United States. The source basins for the model parameters used by these Segments are from calibrated basins in Pennsylvania, Vermont and Indiana (the names of these states from the basis for 'Pavertin' which is the name of the river for this Forecast Group). Rainfall runoff models used include the Sacramento Soil Moisture Accounting Model (SAC-SMA), the Cincinnati API model (API-CIN) and the Continuous API model (API-CONT). All of the Segments in the Forecast Group include the SNOW-17 snow accumulation and ablation model. Elevations in the basin range from about 400 feet at the outlet of the FTWNE Segment to slightly over 4,000 feet along the southern divide of the ELRNE and WEHNE Segments.

Like the PEC Forecast Group, no other Forecast Groups are tributary to the PAV Forecast Group, but the outflow from the most downstream Segment, FTWNE, is used in the SLMWE Segment in the YEL Forecast Group. The following sections describe the individual Segments in the PAV Forecast Group.

Segment Name: ELRNE

Description: Pavertin River at Eldred
Upstream Segments: (none)
Downstream Segment: WEHNE
Source of Basin Parameters: Allegheny River at Eldred, PA
Local Area: 856 MI2
Total Area: 856 MI2
Total Storm Precipitation: 5.56 IN
Peak 6-hour Precipitation: 3.85 IN

Background/Segment Description: The ELRNE Segment is the headwater basin for the Pavertin River. It has a fairly large drainage and is modeled with a single MAP area. Table A-9 is a summary of the Operations Table for this Segment which includes each of the common Operations Table components.

System Issues: The setup of the dataset includes a Segment redefinition for ELRNE. The only changes made are in the SAC-SMA model parameters and initial conditions.

Table A-9. Operations Table for Segment ELRNE

Operation Identifier	Operation Name	Comment
SNOW-17	ELRNE	Basin snow model computations
SAC-SMA	ELRNE	Rainfall/runoff model computations
UNIT-HG	ELRNE	Application of unit hydrograph to computed runoff
STAGE-Q	ELRNE	Compute discharge from observed stage
ADJUST-Q	ELRNE	Adjust simulated discharge to observed data
STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	ELRNE	Plot rain+melt, runoff and flow components

Segment Name: WEHNE

Description: Pavertin River at West Hartford
Upstream Segments: ELRNE
Downstream Segment: FTWNE
Source of Basin Parameters: White River at West Hartford, VT
Local Area: 560 MI2
Total Area: 1,416 MI2
Total Storm Precipitation: 3.85 IN (upper)
1.99 IN (lower)
Peak 6-hour Precipitation: 2.35 IN (upper)
1.68 IN (lower)

Background/Segment Description: The WEHNE Segment contains both an upper and a lower area which use both a snow model and the SAC-SMA soil moisture accounting model. The use of upper and lower areas is usually associated with the occurrence of significant elevation changes within a basin. In this case, however, the two areas are used to compute the runoff separately upstream and downstream of Kinzua Dam, which is located in the middle of the sub-basin.

Table A-10 is a summary of the Operations Table. The upstream flow from ELRNE is routed to the reservoir, combined with the upper area local flow and used as input to the RES-SNGL Operation for Kinzua Dam. The reservoir simulation includes the use of power generation and flashboard capabilities. The outflow is adjusted for observations, routed to the basin outlet and combined with the downstream local flow. The total discharge is again adjusted for observations.

Table A-10. Operations Table for Segment WEHNE

Operation Identifier	Operation Name	Comment
SNOW-17	WEHNEUPR	Upper area snow model computations
SAC-SMA	WEHNEUPR	Upper area rainfall/runoff model computations
UNIT-HG	WEHNEUPR	Upper area unit hydrograph application
LAY-COEF	ROUTELR	Route ELRNE flow to Kinzua Reservoir
ADD/SUB	RESINFLO	Combine upper area runoff with upstream

		routed flow
STAGE-Q	KINNE	Compute Kinzua discharge from tailwater obs
MERGE-TS	KINNE	Combine observed and projected discharge
MEAN-Q	RESINFLO	Compute mean reservoir inflow from combined inflows
RES-SNGL	KINNE	Perform single reservoir simulation
ADJUST-Q	KINNE	Adjust Kinzua dam simulated outflow to observed outflow
PLOT-TUL	POOL	Plot observed, simulated and adjusted pool elevations
PLOT-TUL	KINNE	Plot rain+melt, runoff and flow components: upstream and local area flow, reservoir inflow and simulated, observed, projected and adjusted outflows
SNOW-17	WEHNELWR	Lower area snow model computations
SAC-SMA	WEHNELWR	Lower area rainfall/runoff model computations
UNIT-HG	WEHNELWR	Lower area unit hydrograph application
MUSKROUT	KINNE	Route Kinzua Dam outflow to basin outlet
ADD/SUB	KINNERTD	Accumulate routed flow to WEHNE discharge
ADD/SUB	LOCAL	Accumulate local flow to WEHNE discharge
STAGE-Q	WEHNE	Compute discharge from observed stage
ADJUST-Q	WEHNE	Adjust simulated discharge to observed data
STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	WEHNE	Plot rain+melt, runoff and flow components

Segment Name: WHINE

Description: White River at White River Dam
Upstream Segments: (none)
Downstream Segment: FTWNE
Source of Basin Parameters: White River at West Hartford, VT
Local Area: 350 MI2
Total Area: 350 MI2
Total Storm Precipitation: 3.04 IN
Peak 6-hour Precipitation: 1.88 IN

Background/Segment Description: The WHINE Segment is based on the same source basin as the WEHNE Segment, but uses a Continuous API model instead of the Sacramento model for rainfall runoff simulation.

Table A-11 is a summary of the Operations Table. A reservoir simulation of the White River dam is performed at the outlet of the basin. The reservoir simulation attempts to maintain a constant pool elevation of 25 feet by releasing the inflow up to 1000 CFS. For higher inflow, a constant release of 1000 CFS is maintained until the uncontrolled spillway crest is reached and begins to operate.

Table A-11. Operations Table for Segment WHINE

Operation Identifier	Operation Name	Comment
SNOW-17	WHINE	Basin snow model computations
API-CONT	WHINE	Rainfall/runoff model computations
UNIT-HG	WHINE	Application of unit hydrograph to computed runoff
UNIT-HG	WHINEB	Application of unit hydrograph to groundwater portion of total inflow, for use in PLOT-TUL WHINE
MEAN-Q	LOCALFLO	Compute mean reservoir inflow from instantaneous runoff hydrograph
RES-SNGL	WHINE	Perform single reservoir simulation for White River Dam
PLOT-TUL	POOL	Plot simulated, observed and adjusted pool elevations
PLOT-TUL	WHINE	Plot inflow, outflow and baseflow hydrographs

Segment Name: FTWNE

Description: Pavertin River at Fort Wayne
Upstream Segments: WEHNE, WHINE
Downstream Segment: SLMWE
Source of Basin Parameters: Maumee River at Fort Wayne, IN
Local Area: 375 MI2
Total Area: 2,141 MI2
Total Storm Precipitation: 1.36 IN
Peak 6-hour Precipitation: 0.78 IN

Background/Segment Description: The FTWNE Segment is the most downstream in the PAV Forecast Group.

Table A-12 shows the Operations Table this Segment. Flows from the upstream basins are routed individually to the basin outlet and combined with the local runoff. This Segment also illustrates how a lookup table can be used to compute river flow velocity at the gage.

Table A-12. Operations Table for Segment FTWNE

Operation Identifier	Operation Name	Comment
SNOW-17	FTWNE	Basin snow model computations
API-CIN	FTWNE	Rainfall/runoff model computations
UNIT-HG	FTWNE	Application of unit hydrograph to computed runoff
BASEFLOW	FTWNE	Baseflow with a variable reduction rate
ADD/SUB	ADD_ROQ	Combine surface runoff and baseflow for local area
ADD/SUB	ADD_BF	"
LAY-COEF	ROUTEWEH	Route upstream flow from WEHNE to basin outlet
LAY-COEF	ROUTEWHI	Route upstream flow from WHINE to basin outlet

ADD/SUB	ADD_WEH	Combine routed upstream flows
ADD/SUB	ADD_WHI	"
ADD/SUB	LOCAL	Add local flow to combined upstream flows
STAGE-Q	FTWNE	Compute discharge from observed stage
STAGE-Q	SSTG	Compute stage from simulated discharge
LOOKUP	VELOCITY	Compute simulated mean river velocity from simulated discharge for tabulation in PLOT-TUL FTWNE
PLOT-TUL	FTWNE	Plot rain+melt, runoff and flow components

Forecast Group YEL (Yelloweagle)

The YEL Forecast Group coincides with the boundaries of a state called 'West' and is representative of watersheds in the Western United States. The source basins for the snow and rainfall runoff model parameters in this Forecast Group are from basins in Alaska, Colorado, Montana, Idaho and Oregon. The mainstem river found in the Forecast Group is the Yelloweagle River, whose name is derived from the Yellowstone and Eagle Rivers, both of which are represented in the source basin parameters found in two of the Forecast Group's Segments. All six of the Segments found in this Forecast Group use the SAC-SMA model for rainfall runoff simulation. Each Segment also includes the SNOW-17 snow accumulation and ablation model. Although less than 50% of the Forecast Group is covered with snow, the highest snow accumulations occur in this Forecast Group. The highest elevations and the most rapidly varying topography in the dataset occur in this Forecast Group, reflecting the mountainous terrain of the Western United States.

Special characteristics of the Forecast Group include two reservoirs, a glacier and several diversions outside of the basin. This Forecast Group also includes the PEC and PAV Forecast Groups as tributaries. The Segments that make up this Forecast Group are described below.

Segment Name: BRLWE

Description:	Bradley Lake
Upstream Segments:	(none)
Downstream Segment:	EAGWE
Source of Basin Parameters:	Bradley Lake, AK
Local Area:	120 MI2
Total Area:	120 MI2
Total Storm Precipitation:	1.13 IN
Peak 6-hour Precipitation:	0.42 IN

Background/Segment Description: BRLWE is the headwater basin for the Yelloweagle River. It is the smallest Segment in the dataset and is further subdivided into two elevation zones plus a glacier zone. Most of the area in the sub-basin lies between elevations 8,000 and 12,000 feet.

Table A-13 is a summary of the Operations Table. The runoff from the two elevation zones and the glacier is combined, a diversion from the

basin is subtracted and the result is used as inflow to the reservoir simulation. The reservoir Operation simulates a simple elevation-discharge relationship.

Table A-13. Operations Table for Segment BRLWE

Operation Identifier	Operation Name	Comment
SNOW-17	BRLG	Snow model computations for Bradley Lake glacier
SNOW-17	BRLNL	Snow model for non-glacier, < 10,000 ft
SNOW-17	BRLNU	Snow model for non-glacier, > 10,000 ft
SAC-SMA	BRLG	Rainfall/runoff computations for Bradley Lake glacier
SAC-SMA	BRLNL	Rainfall/runoff model for non-glacier, < 10,000 ft
SAC-SMA	BRLNU	Rainfall/runoff model for non-glacier, > 10,000 ft
UNIT-HG	BRLNU	Application of unit hydrograph to non-glacier runoff, > 10K ft
UNIT-HG	BRLNL	Application of unit hydrograph to non-glacier runoff, < 10K ft
UNIT-HG	BRLG	Application of unit hydrograph to Bradley Lake glacier
ADD/SUB	BRLNU	Combine runoff from upper, lower and glacier areas
ADD/SUB	BRLNL	"
ADD/SUB	BRLG	"
ADD/SUB	BRLDIV	Subtract diversions from the Segment
ADJUST-Q	BLUWE	Adjust simulated inflow with observed data
MEAN-Q	BLUWE	Compute mean inflow for use in RES-SNGL Operation
RES-SNGL	BLUWE	Single reservoir simulation for Bradley Lake
CHANGE-T	BRLG	Change rain + melt time series for Bradley Lake glacier from 6-hr to 24-hr accumulation for the PLOT-TUL BRLSNOW Operation
CHANGE-T	BRLNL	Change interval for rain + melt time series for non-glacier < 10K ft
CHANGE-T	BRLNU	Change interval for rain + melt time series for non-glacier > 10K ft
CHANGE-T	BRLWE	Change interval for MAT time series for non-glacier > 10K ft
STAGE-Q	BRLWE	Compute discharge from observed stage
ADJUST-Q	BRLWE	Adjust simulated discharge to observed data
STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	BRLSNOW	Plot snow model components
PLOT-TUL	BLUWE	Plot Bradley Lake inflow components
PLOT-TUL	BRLWE	Plot Bradley Lake outflow data

Segment Name: EAGWE

Description:	Yelloweagle River near Eagle
Upstream Segments:	BRLWE
Downstream Segment:	CORWE
Source of Basin Parameters:	Eagle River at Gypsum, CO
Local Area:	575 MI2
Total Area:	695 MI2
Total Storm Precipitation:	1.19 IN (upper)
	0.18 IN (lower)
Peak 6-hour Precipitation:	0.42 IN (upper)
	0.08 IN (lower)

Background/Segment Description: Elevations in the EAGWE Segment range from about 5,000 feet at the outlet to over 12,000 feet along the basin divide which separates the Yelloweagle and Texorado basins. The EAGWE Segment includes separate snow, rainfall runoff and unit hydrograph models for upper and lower areas.

Table A-14 is a summary of the Operations Table. The upstream discharge from BRLWE is routed to the basin outlet and combined with the local flow. This Segment uses the RSNWELEV Operation to determine the elevation that separates rain from snow during precipitation events based on a temperature and a lapse rate or actual observations of the freezing level. A diversion from the basin to the adjoining DRGSW Segment in the TEX Forecast Group is also included.

Table A-14. Operations Table for Segment EAGWE

Operation Identifier	Operation Name	Comment
RSNWELEV	EAGWE	Determine the rain-snow line in the basins
SNOW-17	EAGWEUPR	Snow model computations for the upper area
SAC-SMA	EAGWEUPR	Rainfall/runoff model computations for the upper area
UNIT-HG	EAGWEUPR	Application of unit hydrograph to computed runoff
CHANGE-T	ORYWE	Generate 6-hour instantaneous diversion flow from 24-hour mean diversion
ADD/SUB	ORYWE	Subtract Ouray diversion (to DRGSW) from upper area
SNOW-17	EAGWELWR	Snow model computations for the lower area
SAC-SMA	EAGWELWR	Rainfall/runoff model computations for the lower area
UNIT-HG	EAGWELWR	Application of unit hydrograph to computed runoff
ADD/SUB	EAGWEUPR	Combine upper and lower area flow
ADD/SUB	EAGWELWR	"
LAG/K	BRLWE	Route flow from upstream Segment to basin outlet
ADD/SUB	ROUTED	Combine routed flow with local flow
STAGE-Q	STG_TO_Q	Compute discharge from observed stage
ADJUST-Q	EAGWE	Adjust simulated discharge to observed data

STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	EAGWE	Plot rain+melt, runoff and flow components

Segment Name: ANMWE

Description:	Silverton River near Animas
Upstream Segments:	(none)
Downstream Segment:	CORWE
Source of Basin Parameters:	Animas River at Durango, CO
Local Area:	493 MI2
Total Area:	493 MI2
Total Storm Precipitation:	1.27 IN (upper)
	1.14 IN (lower)
Peak 6-hour Precipitation:	0.45 IN (upper)
	0.70 IN (lower)

Background/Segment Description: The ANMWE Segment is a headwater basin that flows into the Yelloweagle River. The majority of the basin is at high elevations ranging from 6,000 to 12,000 feet. The rain-snow line is computed from both observed and future freezing level time series. The elevation of the rain-snow line computed here is also used in the CORWE Segment, immediately downstream.

Table A-15 is a summary of the Operations Table. In this Segment, a weighted combination of the runoff from the upper and lower areas is performed and the unit hydrograph is applied to the result (as opposed to applying unit hydrographs individually to upper and lower areas and then combining the resulting flows). A number of other time series are weighted in a similar manner to be included in the plots for the Segment.

Table A-15. Operations Table for Segment ANMWE

Operation Identifier	Operation Name	Comment
WEIGH -TS	OBS_ZELV	Determine weighted combination of freezing level time series at two stations (SLE, PWA)
WEIGH-TS	FUT_ZELV	Determine Weighted combination of freezing level time series at two stations (WYS, ICT)
CHANGE-T	OBS_ZELV	Change time interval of first WEIGH -TS result from 12-hour to 6-hour
MERGE-TS	ZELV	Merge the weighted freezing level time series, giving preference to the first
RSNWELEV	ANMWE	Determine the rain-snow line from freezing level observations and temperatures; used for CORWE Segment as well
SNOW-17	ANMWEUPR	Perform upper area snow model computations
SAC-SMA	ANMWEUPR	Upper area rainfall/runoff model computations
SNOW-17	ANMWELWR	Perform lower area snow model computations
SAC-SMA	ANMWELWR	Lower area rainfall/runoff model

		computations
WEIGH-TS	INFW	Determine weighted combination of upper & lower area runoff
UNIT-HG	ANMWE	Unit hydrograph computations using weighted upper and lower area runoff
UNIT-HG	ANMWELWR	Unit hydrograph computations for lower area for plotting only
WEIGH-TS	RAIM	Generate a weighted rain + melt time series for plotting
WEIGH-TS	SASC	Generate a weighted areal extent of snow cover time series
WEIGH-TS	SMZC	Generate a weighted soil moisture zone contents time series
WEIGH-TS	ROCL	Generate a weighted runoff component time series
STAGE-Q	ANMWE	Compute discharge from observed stage
ADJUST-Q	ANMWE	Adjust simulated discharge to observed data
STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	ANMWE	Plot rain+melt, runoff and flow components
PLOT-TUL	ANMRNSNW	Plot freezing level and rain-snow elevation data
PLOT-TS	ANMWE	Simple plot of SAC model components for lower area

Segment Name: CORWE

Description:	Yelloweagle River near Corwin Springs
Upstream Segments:	EAGWE, ANMWE
Downstream Segment:	SLMWE
Source of Basin Parameters:	Yellowstone River near Corwin Spring, MT
Local Area:	981 MI2
Total Area:	2,169 MI2
Total Storm Precipitation:	2.38 IN (upper)
	4.27 IN (lower)
Peak 6-hour Precipitation:	0.96 IN (upper)
	1.97 IN (lower)

Background/Segment Description: Elevations in the CORWE Segment range from around 1,500 feet at the dam to 10,000 feet at the highest elevations. The CORWE Segment receives flow from the EAGWE and ANMWE Segments. These are routed separately to the reservoir at Blue Mesa Dam and combined with the local flow to obtain an instantaneous reservoir inflow time series.

Table A-16 is a summary of the Operations Table. As with several other Segments in the YEL Forecast Group, the runoff computed by the SAC-SMA Operations for the upper and lower areas are weighted according to the area represented and then the runoff is time distributed using a unit hydrograph for the whole area.

Pool elevation measurements are used to compute a change in storage, which is combined with the reservoir outflow to compute daily inflow.

This information is used subsequently in the reservoir Operation adjustment utility. The reservoir simulation simply sets the outflow to equal the discharge downstream of the dam when observations are available and specifies fixed values based on the time of year when observations are not available. The adjustment utility keeps the simulated reservoir pool elevation in line with observed values.

Table A-16. Operations Table for Segment CORWE

Operation Identifier	Operation Name	Comment
TATUM	EAGWERTD	Route upstream flow from EAGWE to CORWE
TATUM	ANMWERTD	Route upstream flow from ANMWE to CORWE
ADD/SUB	SUMRTD1	Combine routed flows from EAGWE and ANMWE
ADD/SUB	SUMRTD2	"
SNOW-17	CORWEUPR	Upper area snow model computations
SAC-SMA	CORWEUPR	Upper area rainfall/runoff model computations
SNOW-17	CORWELWR	Lower area snow model computations
SAC-SMA	CORWELWR	Lower area rainfall/runoff model computations
WEIGH-TS	RAIM	Weighted combination of upper and lower area rain + melt TS
WEIGH-TS	INFW	Weighted combination of upper and lower area runoff TS
UNIT-HG	CORWE	Unit hydrograph computations using weighted runoff TS
ADD/SUB	ROUTED	Combine routed flow and local flow for total reservoir inflow
ADD/SUB	RTD+ROQ	"
STAGE-Q	CORWE	Compute discharge from observed stage downstream of dam
CHANGE-T	PELV	Change time interval for pool elevation time series from 6-hours to 24-hours
LOOKUP	BMDWE	Determine daily reservoir storage from 24-hour pool elevation time series
DELTA-TS	BMDWE	Compute daily change in storage from daily storage time series
ADD/SUB	CSTO	Compute inflow as the sum of change in storage and reservoir outflow
ADD/SUB	RQME	"
ADJUST-Q	BMDWEINF	Generate adjusted instantaneous inflow from simulated instantaneous inflow and computed daily inflow volume
MEAN-Q	BMDWEINF	Compute 6-hour mean discharge from 6-hour simulated inflow
RES-SNGL	BMDWE	Reservoir simulation for Blue Mesa Dam
STAGE-Q	SSTG	Compute simulated stage from simulated discharge
PLOT-TS	BMDWEINF	Plot reservoir flow components with reservoir storage
PLOT-TUL	BMDWEINF	Plot reservoir inflow components
WEIGH-TS	CFSDACFT	Convert reservoir storage units to acre-

		feet
PLOT-TUL	POOL	Plot reservoir pool elevations
PLOT-TUL	CORWE	Plot reservoir outflow

Segment Name: SELWE

Description:	Lowell River at Selway
Upstream Segments:	(none)
Downstream Segment:	SLMWE
Source of Basin Parameters:	Selway River near Lowell, ID
Local Area:	1,012 MI2
Total Area:	1,012 MI2
Total Storm Precipitation:	6.05 IN (upper)
	7.15 IN (lower)
Peak 6-hour Precipitation:	2.69 IN (upper)
	3.25 IN (lower)

Background/Segment Description: The SELWE Segment is a headwater basin on the Lowell River which is a tributary of the Yelloweagle River. Elevations in the basin range from about 1,900 feet at the basin outlet to 12,000 feet along its southern divide bordering with the BRLWE Segment.

Table A-17 is a summary of the Operations Table. The rain-snow line is computed separately for the upper and lower areas. This may be due to the fact that the basin is rather narrow with the upper and lower elevation zones lying distinctly at opposite ends of the basin.

Again, the runoff computed by the SAC-SMA Operations for the upper and lower areas are weighted and the unit hydrograph is applied to the combined runoff. Several other time series from the upper and lower areas are also combined for plotting purposes and a plot of the upper and lower rain-snow lines is made with a corresponding tabulation of the areal extent of snow cover.

System Issues: A Segment redefinition is included for this Segment which consists of adjustments to the areal depletion curve for the snow model in the lower area.

Table A-17. Operations Table for Segment SELWE

Operation Identifier	Operation Name	Comment
RSNWELEV	SELWEUPR	Determine the rain-snow line in the upper area
SNOW-17	SELWEUPR	Snow model computations for the upper area
SAC-SMA	SELWEUPR	Rainfall/runoff model computations for the upper area
RSNWELEV	SELWELWR	Determine the rain-snow line in the lower area
SNOW-17	SELWELWR	Snow model computations for the lower area
SAC-SMA	SELWELWR	Rainfall/runoff model computations for the lower area

WEIGH-TS	INFW	Weighted combination of upper and lower area runoff
UNIT-HG	SELWE	Unit hydrograph computations for combined areas
UNIT-HG	SELWELWR	Unit hydrograph computations for lower area for plotting only
WEIGH-TS	RAIM	Generate a weighted rain + melt time series
WEIGH-TS	SASC	Generate a weighted areal extent of snow cover time series
STAGE-Q	SELWE	Compute discharge from observed stage
ADJUST-Q	SELWE	Adjust simulated discharge to observed data
STAGE-Q	SSTG	Compute stage from adjusted discharge
PLOT-TUL	SELWE	Plot rain+melt, runoff and flow components
PLOT-TUL	SELWESNW	Plot rain-snow elevations for upper and lower areas

Segment Name: SLMWE

Description:	Yelloweagle River near Salem
Upstream Segments:	JOSNC, FTWNE, CORWE, SELWE
Downstream Segment:	(none)
Source of Basin Parameters:	South Yamhill River near Whiteson, OR
Local Area:	1,435 MI2
Total Area:	11,800 MI2
Total Storm Precipitation:	7.49 IN (upper)
	5.30 IN (lower)
Peak 6-hour Precipitation:	2.50 IN (upper)
	2.48 IN (lower)

Background/Segment Description: The SLMWE Segment is the last Segment for the YEL Forecast Group and for the YEL Carryover Group. In this Segment, outflow from the JOSNC Segment in the PEC Forecast Group, the FTWNE Segment in the PAV Forecast Group and the SELWE and CORWE Segments in the YEL Forecast Group are combined with the local flow.

Table A-18 is a summary of the Operations Table. The Segment includes an upper and lower area, but the snow model is only used in the upper area. The JOSNC and FTWNE Segments are combined and routed jointly, as are the CORWE and SELWE Segments. Because of the large combined drainage area at SELWE, rapid changes in the discharge and stage do not occur. The final summations of discharge are therefore performed for a 12-hour time interval, although the individual discharge components are at a 6-hour time interval. The operational plot is likewise given at a 12-hour time interval. A relationship was developed between the stage at Salem and the stage upstream at Eugene. The LOOKUP Operation is used to generate a stage forecast at Eugene (EUGWE) based on the forecast stage at Salem and this relationship. This stage is also plotted.

Table A-18. Operations Table for Segment SLMWE

Operation Identifier	Operation Name	Comment
SNOW-17	SLMWEU	Snow model computations for the upper area
SAC-SMA	SLMWEU	Rainfall/runoff model computations for the upper area
UNIT-HG	SLMWEU	Unit hydrograph computations for upper area
SAC-SMA	SLMWEL	Rainfall/runoff model computations for the lower area
UNIT-HG	SLMWEL	Unit hydrograph computations for lower area
ADD/SUB	SLMWEU	Add upper area and lower area flow to local flow time series
ADD/SUB	SLMWEL	"
ADD/SUB	SLMWE	Add local flow time series to total flow time series
ADD/SUB	JOSNC	Combine JOSNC and FTWNE discharges
ADD/SUB	FTWNE	
LAG/K	JOS+FTW	Route combined JOSNC+FTWNE flow to SLMWE
ADD/SUB	CORWE	Combine CORWE and SELWE discharges
ADD/SUB	SELWE	"
LAG/K	COR+SEL	Route combined CORWE+SELWE flow to SLMWE
ADD/SUB	JOSFTWRT	Combine routed upstream flows with total flow time series
ADD/SUB	CORSELRT	"
STAGE-Q	SLMWE	Compute discharge from observed stage
CHANGE-T	SLMQIN	Change 6-hour observed stage to 12-hour
STAGE-Q	SLMSSTG	Compute stage from simulated discharge
CHANGE-T	SLMMAPU	Change 6-hour MAP to 12-hour MAP for plotting
CHANGE-T	SLMMAPL	Change 6-hour MAP to 12-hour MAP for plotting
LOOKUP	EUGENE	Compute EUGWE stage using relationship with SLMWE stage
PLOT-TUL	SLMWE	Plot rain+melt, runoff and flow components for SLMWE
PLOT-TUL	EUGWE	Plot estimated and observed stages at EUGWE

Carryover Group TEX (Texorado)

The TEX Carryover Group includes two Forecast Groups, BRG for the Blueridge River and TEX for the Texorado River and covers approximately the southern half of the dataset area. The Blueridge River joins the Texorado River in the most downstream Segment of the TEX Forecast Group.

Forecast Group BRG

The BRG Forecast Group is located within a state called 'South East', with its Segments representing watersheds in the Eastern United States. The model parameters for the Segments come from basins in

North Carolina, Virginia, Maryland and Pennsylvania. Rainfall runoff models used in this Forecast Group include the Continuous API model (API-CONT), the Sacramento model (SAC-SMA) and two API models developed at the Mid-Atlantic RFC in Harrisburg, Pennsylvania (API-HAR, API-HAR2). All of the Segments are defined with snow models, although only two of the basins have snow accumulations at the beginning of the event and even these accumulations are light and cover only a fraction of the area in the Segments. The Segments are described below.

Segment Name: ROSSE

Description:	Blueridge River at Rosman
Upstream Segments:	(none)
Downstream Segment:	BLASE
Source of Basin Parameters:	French Broad at Rosman, NC
Local Area:	315 MI2
Total Area:	315 MI2
Total Storm Precipitation:	20.90 IN
Peak 6-hour Precipitation:	5.63 IN

Background/Segment Description: The ROSSE Segment is the headwater Segment for the Blueridge River. Elevations range from about 1,000 feet to 6,000 feet.

Table A-19 is a summary of the Operations Table. The unit hydrograph for this Segment is defined in such a way as to generate outflows at a 3-hour time interval using a channel inflow time series defined at a 6-hour interval. It is, in fact a 6-hour unit hydrograph. The Operation plot, however, is defined for a 6-hour plotting interval and several time series must be converted from 3 to 6-hours for plotting.

Table A-19. Operations Table for Segment ROSSE

Operation Identifier	Operation Name	Comment
SNOW-17	ROSSE	Basin snow model computations
API-CONT	ROSSE	Rainfall/runoff model computations
UNIT-HG	ROSSE	Application of unit hydrograph to computed runoff (6-hour unit graph, 3-hour ordinates)
UNIT-HG	ROSSEB	Application of unit hydrograph to groundwater portion of total inflow, for use in PLOT-TUL DARNC (6-hour unit graph, 3-hour ordinates)
STAGE-Q	ROSSE	Compute discharge from observed stage
ADJUST-Q	ROSSE	Adjust simulated discharge to observed data
STAGE-Q	QINE	Compute stage from adjusted discharge
CHANGE-T	SQIN	Change simulated discharge TS from 3-hour to 6-hour time interval
CHANGE-T	QINE	Change adjusted discharge TS from 3-hour to 6-hour time interval

CHANGE-T	SSTG	Change simulated stage TS from 3-hour to 6-hour time interval
CHANGE-T	GWFLOW	Change simulated baseflow TS from 3-hour to 6-hour time interval
INSQPLOT	ROSSE	3-hour instantaneous discharge plot
PLOT-TUL	ROSSE	Plot rain+melt, runoff and flow components, 6-hour interval

Segment Name: BLASE

Description: Blueridge River near Blantyre (BLASE); Davidson River at Brevard (BVDSE)
Upstream Segments: ROSSE
Downstream Segment: WIBSE
Source of Basin Parameters: French Broad at Blantyre, NC; Davidson River near Brevard, NC
Local Area: 431 MI2
Total Area: 746 MI2
Total Storm Precipitation: 18.35 IN (BLASE)
20.41 IN (BVDSE)
Peak 6-hour Precipitation: 5.75 IN (BLASE)
5.38 IN (BVDSE)

Background/Segment Description: The BLASE Segment has a separate area defined for the Davidson River at Brevard, which is a tributary that joins the Blueridge River just upstream of the basin outlet. This may reflect a previously defined Segment where the gage is no longer reporting and a forecast is no longer issued.

Table A-20 is a summary of the Operations Table. The Segment includes the use of the BLASE channel inflow (runoff) as input to unit hydrograph computations for small areas associated with the BVDSE and ROSSE areas. The complexities of the Operations Table result in loss of information from the upstream areas, which appears to be an error in the definition of the Segment.

Table A-20. Operations Table for Segment BLASE

Operation Identifier	Operation Name	Comment
SNOW-17	BVDSE	Snow model computations for Davidson @ Brevard (BVDSE)
SAC-SMA	BVDSE	BVDSE rainfall runoff model computations
UNIT-HG	BVDSE	Application of unit hydrograph to computed runoff (6-hour unit graph, 3-hour ordinates)
ADD/SUB	BVDSE	Add 3-hour discharge to 6-hour BVDSE discharge time series (same effect as CHANGE-T in this case) for use in PLOT-TUL
CHANGE-T	ROSSE	Change 3-hour ROSSE discharge time series to 6-hour interval for PLOT-TUL
SNOW-17	BLASE	Snow model computations for BLASE
SAC-SMA	BLASE	BLASE rainfall runoff model computations

UNIT-HG	ROSSEX	Unit hydrograph for extra area associated with Rosman, discharge added to upstream ROSSE discharge
LAG/K	ROSSE	Route total Rosman flow to BLASE using lag only
UNIT-HG	BVDSEX	Unit hydrograph for extra area associated with Brevard, discharge added to BVDSE discharge
LAG/K	BVDSE	Route total Brevard flow to BLASE using lag only
UNIT-HG	LOCAL	Unit hydrograph for local area, added to routed flow from Rosman
LAG/K	BLASE	Attenuate combined local and Rosman flow (K only)
CHANGE-T	BLASE	Change 3-hour BLASE discharge to 6-hour (overwriting total BVDSE discharge)
STAGE-Q	BLASE	Compute discharge from observed stage
ADJUST-Q	BLASE	Adjust simulated discharge to observed data
STAGE-Q	QINE	Compute stage from adjusted discharge
PLOT-TUL	BLASE	Operational plot

egment name: WIBSE
Description: Blueridge River at Williamsburg
Upstream Segments: BLASE
Downstream Segment: PORSE
Source of Basin Parameters: Juniata River at Williamsburg, PA
Local Area: 677 MI2
Total Area: 1,423 MI2
Total Storm Precipitation: 10.52 IN
Peak 6-hour Precipitation: 3.28 IN

Background/Segment Description: Table A-21 is a summary of the Operations Table. The flow from BLASE is routed and combined with the local flow to generate the reservoir inflow for Dahlgereen Dam. The reservoir simulation includes operation for power generation except when discharge is too high or too low.

Table A-21. Operations Table for Segment WIBSE

Operation Identifier	Operation Name	Comment
LAG/K	BLASE	Route upstream flow from BLASE to reservoir
SNOW-17	WIBSE	Basin snow model computations
API-HAR2	WIBSE	Rainfall runoff model computations
UNIT-HG	WILMSBRG	Unit hydrograph computations for basin runoff
BASEFLOW	WILMSBRG	Variable baseflow computation
ADD/SUB	ROUTED	Combine routed upstream discharge, baseflow and local runoff
ADD/SUB	ADD BF	"
ADD/SUB	ADD RO Q	"

MEAN-Q	DAHSEINF	Compute mean reservoir inflow
RES-SNGL	DAHSE	Perform reservoir simulation, including power generation and adjustment for observed data
CHANGE-T	BFR-6	Change baseflow recession time series to 6-hour interval
STAGE-Q	TWEL	Compute reservoir outflow from tailwater elevation
MERGE-TS	RQOT	Merge computed outflow with reported outflow
ADJUST-Q	WIBSE	Adjust simulated reservoir outflow to observed data
STAGE-Q	Q TO STG	Compute stage from adjusted discharge
PLOT-TUL	DAHSE	Plot reservoir inflow components
PLOT-TUL	POOL	Plot pool elevations
PLOT-TUL	WIBSE	Plot simulated and adjusted outflows

Segment Name: REMSE

Description: Rappahanock River near Remington
Upstream Segments: (none)
Downstream Segment: PORSE
Source of Basin Parameters: Rappahannock River at Remington, VA
Local Area: 670 MI2
Total Area: 670 MI2
Total Storm Precipitation: 9.53 IN
Peak 6-hour Precipitation: 3.56 IN

Background/Segment Description: Table A-22 is a summary of the Operations Table. The outflow from this Segment joins the Blueridge River just downstream of the WIBSE basin outlet.

System Issues: The REMSE Segment is combined with the PORSE Segment in after the first initialization of the forecast database. When stream gaging stations are discontinued, NWS typically does not continue to issue forecasts at the location. The Segment is usually combined with a downstream Segment. The previously defined models and parameters are still used, but the Operations are combined into a single Segment. For purposes of maintaining continuity in the model states, the Operations associated with the discontinued Segment can be redefined with reference to the previously defined Operations and carryover can be maintained from the previous definition of the Operation to the new definition.

Table A-22. Operations Table for Segment REMSE

Operation Identifier	Operation Name	Comment
SNOW-17	REMSE	Basin snow model computations
API-HAR	REMSE	Rainfall runoff model computations
UNIT-HG	REMSE	Unit hydrograph computations for basin runoff
BASEFLOW	REMSE	Variable baseflow computation

ADD/SUB	ADD BF	Combine baseflow and local runoff
ADD/SUB	ADD RO Q	"
CHANGE-T	BFR-6	Change baseflow recession time series to 6-hour interval
STAGE-Q	STG TO Q	Compute discharge from observed stage
ADJUST-Q	REMSE	Adjust simulated discharge to observed data
STAGE-Q	Q TO STG	Compute stage from adjusted discharge
PLOT-TUL	REMSE	Plot rain+melt, runoff and flow components

Segment Name: FDKSE

Description: Monocacy River near Frederick
Upstream Segments: (none)
Downstream Segment: PORSE
Source of Basin Parameters: Monocacy River near Frederick, MD
Local Area: 542 MI2
Total Area: 542 MI2
Total Storm Precipitation: 7.81 IN
Peak 6-hour Precipitation: 3.37 IN

Background/Segment Description: The FDKSE Segment simulates the headwater runoff from the Monocacy River, which is a tributary of the Blueridge River.

Table A-23 is a summary of the Operations Table. Elevations in the Segment range from about 100 feet to 2,000 feet. The rainfall-runoff process is modeled using the API-CONT Operation. In this case, the baseflow runoff component is generated in units of discharge instead of depth, so no unit hydrograph Operation is necessary for the baseflow computation.

System Issues: A Segment redefinition follows the first initialization of the forecast database and includes parameter and carryover changes to the API-CONT Operation.

Table A-23. Operations Table for Segment FDKSE

Operation Identifier	Operation Name	Comment
SNOW-17	FDKSE	Basin snow model computations
API-CONT	FDKSE	Rainfall runoff model computations
UNIT-HG	FDKSE	Unit hydrograph computations for basin runoff
ADD/SUB	BASEFLOW	Add baseflow to surface runoff hydrograph
STAGE-Q	FDKSE	Compute discharge from observed stage
ADJUST-Q	FDKSE	Adjust simulated discharge to observed data
STAGE-Q	QINE	Compute stage from adjusted discharge
PLOT-TUL	FDKSE	Plot rain+melt, runoff and flow components

Segment Name: PORSE

Description:	Blueridge River near Point of Rocks
Upstream Segments:	WIBSE, REMSE, FDKSE
Downstream Segment:	GLFSW
Source of Basin Parameters:	Potomac River at Point of Rocks, MD
Local Area:	585 MI2
Total Area:	3,220 MI2
Total Storm Precipitation:	8.63 IN
Peak 6-hour Precipitation:	4.19 IN

The PORSE Segment is the last Segment in the BRG Forecast Group. Elevations in the basin range from nearly 60 feet to about 500 feet.

Table A-24 is a summary of the Operations Table. The REMSE and WIBSE outflows are combined and routed (with lag only) to the confluence of the Monocacy and Blueridge Rivers. The flow from the FDKSE Segment is then added (with no routing) and the combined flows are routed using a variable lag and variable K to the outlet of the basin. The local flow is then added. In addition to the operational plot, a plot of the 24-hour mean discharge is also provided.

System Issues: Following the first initialization of the forecast parameter files the PORSE Segment is redefined to include the REMSE Segment, which is discontinued.

Table A-24. Operations Table for Segment PORSE

Operation Identifier	Operation Name	Comment
SNOW-17	PORSE	Basin snow model computations
API-HAR	PORSE	Rainfall runoff model computations
UNIT-HG	PORSE	Unit hydrograph computations for basin runoff
BASEFLOW	PORSE	Variable baseflow computation
ADD/SUB	ADD_RO_Q	Combine surface runoff and baseflow components
ADD/SUB	ADD_BF_Q	"
CHANGE-T	BFR-6	Change baseflow recession time series from 24 to 6-hour interval (resulting time series not used elsewhere in Operations Table)
STAGE-Q	STG_TO_Q	Compute discharge from observed stage
ADD/SUB	ADDREMSE	Combine upstream discharge from REMSE and WIBSE
ADD/SUB	ADDWIBSE	"
LAG/K	RT_WI+RE	Route combined flow downstream
ADD/SUB	ADD_SUMQ	Combine routed flow with discharge from FDKSE
ADD/SUB	ADD_FDK	"
LAG/K	RT_ALLQ	Route all upstream flows to PORSE basin outlet
CHANLOSS	SUB_250	Subtract channel loss from routed upstream discharge

ADD/SUB	ADD_RTD	Combine routed upstream discharge with local flow
ADD/SUB	ADD_LCL	"
ADJUST-Q	PORSE	Adjust simulated discharge to observed data
STAGE-Q	Q_TO_STG	Compute stage from adjusted discharge
MEAN-Q	PORSE	Compute 24-hour mean discharge
PLOT-TUL	PORSE	Plot rain+melt, runoff and flow components
PLOT-TUL	MEAN_Q	Plot mean discharge

Forecast Group TEX

The TEX Forecast Group is located within the state of 'South West'. It is the largest Forecast Group, containing Segments representative of several regions including the southern, mid-western and south-western United States. The source basins for snow and rainfall-runoff parameters come from basins in Colorado, Kansas, New Mexico, Oklahoma, Texas, Mississippi and Louisiana. The dataset rivers found in the TEX Forecast Group include the Texorado, Sabine and Calcasieu Rivers, Bird Creek and the Copper and Dillon Forks of the Texorado River. It also receives the flow from the Blueridge River (BRG). Four of the eleven Segments defined include snow models, although significant accumulations exist only in the two headwater basins of the Texorado River. The lower reaches of the river system include a dynamic routing model.

The majority of the Segments use the Sacramento soil moisture accounting model (SAC-SMA). Other rainfall runoff models used include the Continuous API (API-CONT), Salt Lake City API (API-SLC) and the Xinanjiang soil moisture accounting model (XIN-SMA).

Segment Name: BLRSW

Description:	Dillon Fork at Blue
Upstream Segments:	(none)
Downstream Segment:	DDCSW
Source of Basin Parameters:	Blue River near Dillon, CO
Local Area:	288 MI2
Total Area:	288 MI2
Total Storm Precipitation:	0.30 IN (upper)
	0.00 IN (lower)
Peak 6-hour Precipitation:	0.16 IN (upper)
	0.00 IN (lower)

Background/Segment Description: The BLRSW Segment is one of the headwater Segments for the Texorado River. Both an upper and lower area are included.

Table A-25 is a summary of the Operations Table. A diversion from outside the area is added to the flow from this basin.

Table A-25. Operations Table for Segment BLRSW

Operation Identifier	Operation Name	Comment
SNOW-17	BLRSWUPR	Snow model computations for the upper area
SAC-SMA	BLRSWUPR	Rainfall/runoff model computations for the upper area
SNOW-17	BLRSWLWR	Snow model computations for the lower area
SAC-SMA	BLRSWLWR	Rainfall/runoff model computations for the lower area
WEIGH-TS	INFW	Weight upper (1/3) and lower (2/3) area runoff to develop combined runoff
UNIT-HG	BLRSW	Unit hydrograph computations for combined runoff
ADD/SUB	LRSW	Add diversion from outside of RFC
WEIGH-TS	RAIM	Weight upper (1/3) and lower (2/3) area RAIM time series
WEIGH-TS	SASC	Weight upper (1/3) and lower (2/3) area SASC time series
STAGE-Q	STAGE	Compute discharge from observed stage
ADJUST-Q	BLRSW	Adjust simulated discharge to observed data
PLOT-TUL	BLRSW	Operational plot, including diversion discharge, weighted upper and lower area rain+melt and runoff

Segment Name: DRGSW

Description: Copper Fork at Durango
Upstream Segments: (none)
Downstream Segment: DDCSW
Source of Basin Parameters: Animas River at Durango, CO
Local Area: 370 MI2
Total Area: 370 MI2
Total Storm Precipitation: 2.62 IN (upper)
4.88 IN (lower)
Peak 6-hour Precipitation: 0.68 IN (upper)
1.93 IN (lower)

Uses different model from ANMWE

Background/Segment Description: The DDCSW Segment is the other headwater Segment for the Texorado River. Although it shares the same source basin for rainfall-runoff model parameters with the ANMWE Segment, different runoff models are used.

Table A-26 is a summary of the Operations Table. Observations of freezing level are used to determine the rain-snow line. Both an upper and lower area are included and weighted combination of the upper and lower runoff is made before applying the unit hydrograph. The DRGSW Segment receives flow through a diversion from the EAGWE Segment. The diversion is based on observed and projected flows at the ORYWE station, so that no dependency exists in the order of computation of the Segments. This allows them to be in different Carryover Groups.

Table A-26. Operations Table for Segment DRGSW

Operation Identifier	Operation Name	Comment
WEIGH-TS	OBS_ZELV	Combine SLE and PWA data for observed elevations
WEIGH-TS	FUT_ZELV	Combine ICT and WYS data for future elevations
CHANGE-T	OBS_ZELV	Change time interval for observed elevations from 12 to 6-hours
MERGE-TS	ZELV	Merge observed and future elevations
RSNWELEV	DRGSW	Determine the rain-snow line
SNOW-17	DRGSWUPR	Snow model computations for the upper area
API-CONT	DRGSWUPR	Rainfall/runoff model computations for the Upper area
SNOW-17	DRGSWLWR	Snow model computations for the lower area
API-CONT	DRGSWLWR	Rainfall/runoff model computations for the lower area
WEIGH-TS	INFW	Weight upper (0.3) and lower (0.7) area runoff contributions
UNIT-HG	DRGSW	Unit hydrograph computations for combined areas
CHANGE-T	DQMP	Change time interval of ORYWE diversion from 24 to 6-hour
ADD/SUB	DIVRSION	Add the diversion to the basin discharge
WEIGH-TS	GWRO	Weight the upper and lower area groundwater inflow components
UNIT-HG	DRGSWB	Apply unit hydrograph to determine groundwater component of total discharge
UNIT-HG	DRGSWLWR	Apply unit hydrograph to determine lower area runoff component of total discharge
WEIGH-TS	RAIM	Weight the upper and lower area rain+melt time series
WEIGH-TS	SASC	Weight the upper and lower area snow cover time series (never used)
STAGE-Q	STAGE	Compute discharge from observed stage
ADJUST-Q	DRGSW	Adjust simulated discharge to observed data
STAGE-Q	FLOW	Compute stage from adjusted discharge
PLOT-TUL	DRGSW	Operational plot, including baseflow, lower area and diversion runoff components

Segment Name: DDCSW

Description: Pueblo Dam; Texorado River at Dodge City
Upstream Segments: BLRSW, DRGSW
Downstream Segment: TLSSW
Source of Basin Parameters: Arkansas River, Pueblo Dam, CO; Arkansas River at Dodge City, KS
Local Area: 565 MI2
Total Area: 1,223 MI2
Total Storm Precipitation: 0.14 IN (PDASW upper)

	0.12	IN (PDASW lower)
	1.21	IN (DDCSW)
Peak 6-hour Precipitation:	0.07	IN (PDASW upper)
	0.07	IN (PDASW lower)
	0.62	IN (DDCSW)

Background/Segment Description: The Texorado River is formed by the confluence of the Copper and Dillon forks at Pueblo Dam in the DDCSW Segment. The Segment is modeled in two reaches, with the upstream reach above Pueblo Dam and the lower reach from the dam to the gage at Dodge City.

Table A-27 is a summary of the Operations Table. The area above the dam includes an upper and lower area, with the upper area receiving only 5% of the weight when the runoff is combined before the unit hydrograph application. The reservoir Operation is designed to simulate a constant pool with a minimum release constraint based on the time of year.

Table A-27. Operations Table for Segment DDCSW

Operation Identifier	Operation Name	Comment
SNOW-17	PDASWUPR	Snow model computations for the upper area of the Pueblo Dam (PDASW) sub-basin
SAC-SMA	PDASWUPR	Rainfall/runoff model computations for PDASW upper area
SNOW-17	PDASWLWR	Snow model computations for PDASW lower area
SAC-SMA	PDASWLWR	Rainfall/runoff model computations for PDASW lower area
WEIGH-TS	INFW	Weight upper (0.05) and lower (0.95) area runoff components
UNIT-HG	PDASW	Unit hydrograph computations for combined areas
LAG/K	BLRSW	Route upstream flow from BLRSW to reservoir
LAG/K	DRGSW	Route upstream flow from DRGSW to reservoir
ADD/SUB	PDASWLOC	Combine PDASW local and routed upstream flows
ADD/SUB	BLRSWRTD	"
ADD/SUB	DRGSWRTD	"
CHANLOSS	PDASW	Account for irrigation losses (monthly variation)
DELTA-TS	PBASW	Compute change in storage from reservoir storage time series
ADD/SUB	CSTO	Add change in storage and reservoir outflow to compute inflow
ADD/SUB	RQME	"
MERGE-TS	RQIM	Merge computed inflow with BOR reported inflow
ADJUST-Q	PDASW	Adjust simulated inflow with reported data
MEAN-Q	ADJ	Compute mean 6-hour inflow based on

Operation Identifier	Operation Name	Comment
		adjusted inflow
MEAN-Q	SIM	Compute mean 6-hour inflow based on simulated inflow
RES-SNGL	PBASW	Single reservoir Operation
CHANGE-T	PELV	Change time interval of pool elevation time series from 6 to 24-hours
PLOT-TUL	PBASW24	Plot 24-hour reservoir inflow and outflow components (observed, computed and BOR reported values)
PLOT-TUL	PBASW6	Plot 6-hour reservoir inflow components (simulated & adjusted inflows, local and upstream routed components)
PLOT-TUL	POOL	Plot simulated, observed and adjusted pool elevations
PLOT-TUL	OUTFLOW	Plot simulated and adjusted 6-hour reservoir outflows
LAG/K	PBASW	Route reservoir outflow to DDCSW
SNOW-17	DDCSW	Snow model computations for DDCSW
SAC-SMA	DDCSW	Rainfall/runoff model computations
UNIT-HG	DDCSW	Unit hydrograph computation
ADD/SUB	PBASWRTD	Combine routed flow from reservoir with DDCSW local flow
ADD/SUB	LOCAL2	"
CHANLOSS	DDCSW	Compute 20% loss in channel
STAGE-Q	DDCSW	Compute discharge from observed stage
STAGE-Q	FLOW	Compute stage from simulated discharge
PLOT-TUL	DDCSW	Operational plot - observed, simulated, local and routed flow

Segment Name: SPESW

Description: Bird Creek at Sperry
Upstream Segments: (none)
Downstream Segment: TLSSW
Source of Basin Parameters: Bird Creek near Sperry, OK
Local Area: 771 MI2
Total Area: 771 MI2
Total Storm Precipitation: 7.40 IN
Peak 6-hour Precipitation: 2.48 IN

Background/Segment Description: The SPESW Segment simulates the runoff from Bird Creek, a headwater tributary to the Texorado River immediately upstream of Keystone Dam.

Table A-28 is a summary of the Operations Table.

System Issues: A Segment redefinition is included for this Segment which consists of changes to SAC-SMA model parameters and carryover. In the SPESW Segment redefinition, the carryover values are adjusted, but the 'RDCO' flag is not set, so the normal carryover transfer is performed.

Table A-28. Operations Table for Segment SPESW

Operation Identifier	Operation Name	Comment
SAC-SMA	SPESW	Rainfall/runoff model computations
UNIT-HG	SPESW	Unit hydrograph computation
LAY-COEF	SPESW	Use layered coefficient routing to attenuate flow within a confined flow range
STAGE-Q	STAGE	Compute discharge from observed stage
ADJUST-Q	SPESW	Adjust simulated discharge to observed data
STAGE-Q	FLOW	Compute stage from adjusted discharge
INSQPLOT	SPESW	Instantaneous flow plot for observed, simulated and adjusted flow
PLOT-TUL	SPESW	Standard operational plot

Segment Name: TLSSW

Description:	Texorado River at Tulsa (Texorado-Taos, TAOSW; Keystone Dam, KEYSW; Tulsa local, TLSSW)
Upstream Segments:	DDCSW, SPESW
Downstream Segment:	GLFSW (HATSW)
Source of Basin Parameters:	Rio Grande at Taos, NM; Arkansas River at Keystone Dam, OK; Arkansas River at Tulsa, OK
Local Area:	1,200 MI2
Total Area:	3,194 MI2
Total Storm Precipitation:	1.65 IN (TAOSW) 5.88 IN (KEYSW) 7.53 IN (TLSSW)
Peak 6-hour Precipitation:	0.62 IN (TAOSW) 2.44 IN (KEYSW) 4.45 IN (TLSSW)

Background/Segment Description: The TLSSW Segment includes three separate runoff areas. The TAOSW area includes local runoff plus the routed flow from DDCSW. The KEYSW area combines the TAOS and SPESW flows with the local flow to Keystone Dam and includes a reservoir simulation. Because the upstream flows inter directly into the reservoir, no routing is necessary. The TLSSW area combines local flow with routed flow from the reservoir, subtracting channel loss through evaporation.

Table A-29 is a summary of the Operations Table. The simulation of Keystone Dam includes provisions for surcharge in the reservoir, power generation releases, downstream protection criteria and low flow releases.

Table A-29. Operations Table for Segment TLSSW

Operation Identifier	Operation Name	Comment
LAG/K	DDCSW	Route upstream flow from DDCSW to TAOSW
API-SLC	TAOSW	Rainfall/runoff model computations for TAOSW
UNIT-HG	TAOSW	Unit hydrograph computation
BASEFLOW	TAOSW	Compute constant baseflow
ADD/SUB	BASEFLOW	Add baseflow and runoff hydrographs
ADD/SUB	TAOSWROQ	"
ADD/SUB	TAOSWLOC	Store TAOSW local flow in a separate time series
ADD/SUB	DDCSWRTD	Add upstream routed flow
CHANLOSS	TAOSW	Compute 10% channel loss from combined flow
SNOW-17	KEYSW	Snow model computations for KEYSW
SAC-SMA	KEYSW	Rainfall/runoff model computations for KEYSW
UNIT-HG	KEYSW	Unit hydrograph computations
ADD/SUB	TAOSW	Combine flow from TAOSW, SPESW and KEYSW local
ADD/SUB	SPESW	"
ADD/SUB	KEYSWLOC	"
MEAN-Q	KEYSWINF	Compute mean 6-hour reservoir inflow
WEIGH-TS	MAP	Weight TAOSW and KEYSW precipitation time series
PLOT-TUL	KEYSWINF	Plot reservoir inflow components
SNOW-17	TLSSW	Snow model computations for TLSSW
SAC-SMA	TLSSW	Rainfall/runoff model computations for TLSSW
UNIT-HG	TLSSW	Unit hydrograph computations
RES-SNGL	KEYSW	Single reservoir Operation including flood surcharge and power generation
ADJUST-Q	KEYSW	Adjust simulated reservoir outflow to observed outflow
PLOT-TUL	KEYSW	Plot simulated, adjusted and observed pool elevations
PLOT-TUL	OUTFLOW	Plot simulated, adjusted and observed reservoir outflows
LAG/K	KEYSW	Route reservoir outflow to basin outlet (TLSSW)
ADD/SUB	KEYSWRTD	Combine routed reservoir discharge with TLSSW local flow
ADD/SUB	TLSSWLOC	"
CHANLOSS	TLSSW	Compute channel loss through evaporation
STAGE-Q	TLSSW	Compute discharge from observed stage
STAGE-Q	FLOW	Compute stage from simulated discharge
PLOT-TUL	TLSSW	Operational plot

Segment Name: FSMSW

Description: Sabine River near Fort Smith
Upstream Segments: (none)

Downstream Segment: EMYSW
Source of Basin Parameters: Bird Creek near Sperry, OK
Local Area: 945 MI2
Total Area: 945 MI2
Total Storm Precipitation: 7.93 IN
Peak 6-hour Precipitation: 4.80 IN

Background/Segment Description: The FSMSW Segment is the headwater basin for the Sabine River. The source basin for rainfall runoff parameters for the FSMSW Segment is the same as the SPESW Segment but the Continuous API model is used for rainfall-runoff simulation instead of the Sacramento model.

Table A-30 is a summary of the Operations Table. An attenuation is applied to the flow using the LAG-K Operation. An adjusted discharge is not computed even though stage observations are available for this Segment.

Table A-30. Operations Table for Segment FSMSW

Operation Identifier	Operation Name	Comment
API-CONT	FSMSW	Rainfall/runoff model computations for TAOSW
UNIT-HG	FSMSW	Unit hydrograph computation
LAG/K	FSMSW	Variable flow attenuation using the K component of LAG/K
UNIT-HG	FSMSWB	Unit hydrograph computation for groundwater component of total discharge
STAGE-Q	STAGE	Compute discharge from observed stage
STAGE-Q	FLOW	Compute stage from simulated discharge
PLOT-TUL	FSMSW	Operational plot - observed, simulated, baseflow

Segment Name: EMYSW

Description: Sabine River near Emory
Upstream Segments: FSMSW
Downstream Segment: GDWSW
Source of Basin Parameters: Sabine River near Emory, TX
Local Area: 570 MI2
Total Area: 1,515 MI2
Total Storm Precipitation: 9.76 IN
Peak 6-hour Precipitation: 5.95 IN

Background/Segment Description: The EMYSW Segment routes the upstream discharge from FSMSW and combines the local flow to obtain the reservoir inflow.

Table 31 is a summary of the Operations Table. The reservoir model simulates a low flow release at low elevations, a controlled release for intermediate reservoir elevations and an uncontrolled spillway at higher elevations. This Operation does not result in a steady pool

elevation.

Table A-31. Operations Table for Segment EMYSW

Operation Identifier	Operation Name	Comment
LOOKUP	FSMSW	Compute variable channel loss using lookup Operation
LAG/K	FSMSW	Route FSMSW flow to lake Tawakoni using variable lag and constant K
ADD/SUB	FSMSW	Put routed flow in reservoir inflow time series
SAC-SMA	EMYSW	Rainfall/runoff model computations for EMYSW
UNIT-HG	EMYSW	Unit hydrograph computation
ADD/SUB	EMYSWLOC	Add local flow to reservoir inflow time series
MEAN-Q	TWKSWINF	Compute mean reservoir inflow
PLOT-TUL	TWKSWINF	Plot reservoir inflow components
STAGE-Q	TWEL	Compute discharge from reservoir tailwater elevation
MERGE-TS	RQOT	Merge computed discharge time series with reported discharge from COE
RES-SNGL	TWKSW	Single reservoir Operation based on pool elevation
PLOT-TUL	TWKSW	Pool elevation and tailwater plot
ADJUST-Q	EMYSW	Adjust simulated discharge to observed values
STAGE-Q	FLOW	Compute stage from adjusted discharge
PLOT-TUL	EMYSW	Plot reservoir outflows

Segment Name: GDWSW

Description: Sabine River near Gladewater
Upstream Segments: EMYSW
Downstream Segment: GLFSW (HATSW)
Source of Basin Parameters: Sabine River near Gladewater, TX
Local Area: 895 MI2
Total Area: 2,410 MI2
Total Storm Precipitation: 12.84 IN
Peak 6-hour Precipitation: 5.12 IN

Background/Segment Description: The GDWSW Segment is the most downstream Segment on the Sabine River. It routes the flow from EMYSW to the basin outlet and combines it with the local flow.

Table A-32 is a summary of the Operations Table. A common aspect of non-headwater Segments is the accumulation of upstream time series into a single time series through two or more ADD-SUB Operations. Often, the individual flows are computed first, followed by a sequence of ADD-SUB Operations. In this Segment and the previous one, the source time series are added to the destination time series immediately after being computed. This illustrates the fact that the

order of placement of Operations is flexible as long as the time series required for a given Operation have been filled previously by the desired Operation.

Table A-32. Operations Table for Segment GDWSW

Operation Identifier	Operation Name	Comment
LAG/K	EMYSW	Route upstream flow from EMYSW to GDWSW using variable lag and K
ADD/SUB	EMYSW	Put routed flow in simulated discharge time series
SAC-SMA	GDWSW	Rainfall/runoff model computations for GDWSW
UNIT-HG	GDWSW	Unit hydrograph computation
ADD/SUB	LOCAL	Add local flow to simulated discharge time series
STAGE-Q	STAGE	Compute discharge from observed stage
STAGE-Q	FLOW	Compute stage from simulated discharge
PLOT-TUL	GDWSW	Operational plot

Segment Name: GLMSW

Description: Calcasieu River near Glenmora
Upstream Segments: (none)
Downstream Segment: GLFSW
Source of Basin Parameters: Calcasieu River near Glenmora, LA
Local Area: 620 MI2
Total Area: 620 MI2
Total Storm Precipitation: 2.96 IN
Peak 6-hour Precipitation: 1.21 IN

Background/Segment Description: The GLMSW Segment is the single Segment for the Calcasieu River, which is a tributary to the Texorado River near its outlet.

Table A-33 is a summary of the Operations Table. In addition to the typical components, a channel loss Operation is performed to simulate monthly evaporation losses.

Table A-33. Operations Table for Segment GLMSW

Operation Identifier	Operation Name	Comment
SAC-SMA	GLMSW	Rainfall/runoff model computations for GLMSW
UNIT-HG	GLMSW	Unit hydrograph computation
CHANLOSS	GLMSW	Compute channel loss through variable monthly evaporation
STAGE-Q	STAGE	Compute discharge from observed stage
ADJUST-Q	GLMSW	Adjust simulated discharge to observed data
STAGE-Q	FLOW	Compute stage from adjusted discharge

PLOT-TUL	GLMSW	Operational plot

Segment Name: HATSW

Description:	Texorado River at Hattiesburg
Upstream Segments:	(TLSSW, GDWSW)
Downstream Segment:	GLFSW
Source of Basin Parameters:	Leaf River near Collins, MS
Local Area:	985 MI2
Total Area:	6,589 MI2
Total Storm Precipitation:	10.23 IN (upper)
	10.12 IN (lower)
Peak 6-hour Precipitation:	4.57 IN (upper)
	3.71 IN (lower)

Background/Segment Description: The HATSW Segment includes the rainfall-runoff simulation for both the HATSW and GLFSW areas, while the downstream GLFSW Segment contains the routing model for the river reaches passing through the two areas.

Table A-34 is a summary of the Operations Table. The TLSSW and GDWSW are listed as upstream because they are tributary to the Texorado River within the HATSW area. In the forecast system, however, they are listed as being upstream of the GLFSW Segment because all of the channel routing takes place there, as well as the computation of the time series for the HATSW and GLFSW forecast points.

The HATSW runoff area is the only one that uses the XIN-SMA Operation. Separate unit hydrographs Operations use the same runoff time series to compute outflow from the upper and lower areas. Each is used separately in the routing model in the GLFSW Segment. The operational plot includes both the HATSW and GLFSW area runoff, but does not include the total discharge or observed values.

Table A-34. Operations Table for Segment HATSW

Operation Identifier	Operation Name	Comment
XIN-SMA	HATSW	Rainfall/runoff model computations for HATSW
UNIT-HG	HATSWU	Unit hydrograph computation for upper area
UNIT-HG	HATSWL	Unit hydrograph computation for lower area
SAC-SMA	GLFSW	Rainfall/runoff model computations for GLFSW
UNIT-HG	GLFSW	Unit hydrograph computation
PLOT-TUL	HATGLFSW	Operational plot

Segment Name: GLFSW

Description:	Texorado River near Gulf
Upstream Segments:	PORSE, TLSSW, GDWSW, GLMSW, HATSW
Downstream Segment:	(none)

Source of Basin Parameters: Pine Island Bayou near Sourlake, TX
Local Area: 1,015 MI2
Total Area: 11,444 MI2
Total Storm Precipitation: 2.22 IN
Peak 6-hour Precipitation: 0.79 IN

Background/Segment Description: The GLFSW Segment is the last Segment for the TEX Forecast Group and Carryover Group. This Segment includes only the DWOPER dynamic routing model and plots of discharges and stages. The runoff model for the GLFSW area is included in the HATSW Segment.

Table A-35 is a summary of the Operations Table. The DWOPER Operation simultaneously solves for the discharge and stage along a main stem river and its tributaries. This requires that the entire modeling reach be included in a single Segment. The model used here includes the main stem of the Texorado River and dynamic tributaries for portions of the Blueridge, Calcasieu and Sabine Rivers. It also includes three lateral inflows from the upper and lower HATSW areas and the GLFSW area.

Table A-35. Operations Table for Segment GLFSW

Operation Identifier	Operation Name	Comment
PLOT-TUL	INFLOW:Q	Plot inflow components to dynamic routing reach
DWOPER	GLFSW	Dynamic routing model with main stem and three tributaries
PLOT-TUL	HATSW	River stage plot at Hattiesburg
PLOT-TUL	MSY	River stage plot at New Orleans
PLOT-TUL	GLFSW	River stage plot at Gulf